

WHAT IS CLAIMED IS:

1. A thermal physical vapor deposition source for vaporizing pellets containing organic materials onto a surface of a substrate in forming a display, comprising:

- (a) a housing defining a plurality of spaced passages each for receiving compacted pellets of organic materials;
- (b) a cover plate over the housing, with a first plurality of openings corresponding to the spaced passages of the housing;
- (c) an electrical heater structure disposed over the cover plate;
- (d) an aperture plate, disposed over the electrical heater structure and having at least one aperture;
- (e) an electrically insulating spacer member located between the electrical heater structure and engaging the aperture plate, such electrically insulating spacer member having at least one opening, corresponding to the first plurality of openings of the cover plate and the spaced passages of the housing; and
- (f) means for applying current to the electrical heater structure to produce heat sufficient to vaporize the pellets and permit vapor efflux of materials to pass through the first plurality of openings of the cover plate, the heater structure, the electrically insulating spacer member and the apertures of the aperture plate, onto the substrate.

2. The thermal physical vapor deposition source of Claim 1, wherein the housing includes thermally insulating material.

3. The thermal physical vapor deposition source of Claim 1, wherein the electrical heater structure includes an electrically conductive heater plate over the cover plate, such heater plate having a second plurality of openings, each opening of the heater plate corresponding to a first plurality opening of the cover plate and corresponding to a spaced passage of the housing.

4. The thermal physical vapor deposition source of Claim 1, wherein the cover plate includes electrically insulating material.

5. The thermal physical vapor deposition source of Claim 1, wherein the electrically insulating spacer member includes electrically insulating material.

6. The thermal physical vapor deposition source of Claim 1, wherein the aperture plate includes electrically insulated material and is electrically insulated from the conductive heater plate by the electrically insulating spacer member.

7. The thermal physical vapor deposition source of Claim 1, wherein different cross-sectional areas of the apertures of the aperture plate are selected to form different flow rates and patterns of vapor efflux.

8. The thermal physical vapor deposition source of Claim 1, wherein the heater structure includes one or more heating elements.

9. The thermal physical vapor deposition source of Claim 1, further includes a mixing zone defined between the electrical heater structure and the aperture plate.

10. The thermal physical vapor deposition source of Claim 1, wherein the electrical heater structure includes a heating array with a plurality of heating elements.

11. The thermal physical vapor deposition source of Claim 1 further including means engageable with pellets in the spaced passages for adjusting the position of the pellets to compensate for material loss during vaporization.

12. A thermal physical vapor deposition source for vaporizing pellets containing organic materials onto a surface of a substrate in forming a display, comprising:

(a) a housing, defining a plurality of spaced passages, each such passage having an open first end and an open second end and being adapted to receive a pellet;

(b) a cover plate, over the housing, with a first plurality of openings, corresponding to the spaced passages of the housing;

(c) an electrical heater structure over the cover plate;

(d) a vaporization zone defined between the housing and the electrical heater structure;

(e) push rods, each being insertable into the open first end of one of the spaced passages for engaging a pellet in the passage and moving the pellet into the vaporization zone;

(f) means for moving the push rods for engaging the pellets, to move the top portion of each pellet into the vaporization zone;

(g) an aperture plate, having at least one aperture;

(h) an electrically insulating spacer member located between the electrical heater structure and engaging the aperture plate, such electrically insulating spacer member having at least one opening, corresponding to the first plurality of openings in the cover plate and the spaced passages of the housing; and

(i) means for applying current to the electrical heater structure sufficient to vaporize the pellets and permit vapor efflux of the materials to pass through the first plurality of openings in the cover plate, the electrical heater structure, the electrically insulating spacer member and the apertures of the aperture plate, onto the substrate;

13. The thermal physical vapor deposition source of claim 12, wherein the housing includes thermally insulating material.

14. The thermal physical vapor deposition source of claim 12, wherein the cover plate includes electrically insulating material.

15. The thermal physical vapor deposition source of claim 12, wherein the electrical heater structure includes an electrically conductive heater plate, over the cover plate, having a second plurality of openings, each of the openings corresponding to each of the first plurality of openings of the cover plate and the spaced passages of the housing.

16. The thermal physical vapor deposition source of claim 12, wherein the spacer member includes electrically insulating material.

17. The thermal physical vapor deposition source of claim 12, wherein the aperture plate includes electrically insulated material and is electrically insulated from the conducting plate by the spacer member.

18. The thermal physical vapor deposition source of claim 12, wherein the apertures of the aperture plate are selected to have different cross-sectional areas to produce different flow rates and patterns of vapor efflux.

19. The thermal physical vapor deposition source of Claim 12, wherein the electrical heater structure includes a heating array with a plurality of heating elements.

20. The thermal physical vapor deposition source of Claim 12, further includes a mixing zone defined between the electrical heater structure and the aperture plate.

21. The thermal physical vapor deposition source of Claim 12 wherein the means for moving the push rods for engaging the pellets includes barreled screws, a common base connected to all the push rods driven by a single screw, a hydraulic or pneumatic jack engaging the push rods at the same time, or an automatic or computer controlled system for operating the movement of the push rods.

22. A thermal physical vapor deposition source for vaporizing pellets containing organic materials onto a surface of a substrate in forming a display, comprising:

(a) a housing, defining a plurality of spaced passages, each such spaced passage having an open first end and an open second end and being adapted to receive a pellet;

(b) a cover plate, over the housing, with a first plurality of openings, corresponding to the spaced passages of the housing;

(c) an electrical heater structure including an electrically conductive heater plate, disposed over the cover plate, with a second plurality of openings corresponding to the first plurality of openings of the cover plate and a heating array including a plurality of heating elements, each such heating element corresponding to each opening in the conductive heater plate;

(d) a vaporization zone defined between the housing and the electrical heater structure;

(e) push rods, each being insertable into the open first end of one of the spaced passages for engaging a pellet and moving the pellet into the vaporization zone;

(f) an electrically insulating spacer member over the electrical heater structure with at least one opening, corresponding to the first plurality of openings in the cover plate and the spaced passages of the housing;

(g) an aperture plate, over the insulating plate, having at least one aperture;

(h) a mixing zone defined between the electrical heater structure and the aperture plate; and

(i) means for applying current to the heating array including the plurality of heating elements, thereby controlling temperature gradients in the electrical heater structure to vaporize the pellets and permit vapor efflux of materials to pass through the first plurality of openings in the cover plate, the second plurality of openings in the electrical heater structure, the electrically insulating spacer member and the apertures of the aperture plate, onto the substrate.

23. A thermal physical vapor deposition source for vaporizing a plurality of pellets containing organic materials onto a surface of a substrate in forming a display, comprising:

(a) a housing, defining a plurality of spaced passages wherein certain passages receive compacted pellets of host organic material and others receive dopant organic material;

(b) a cover plate over the housing, with a first plurality of openings corresponding to the spaced passages of the housing;

(c) an electrical heater structure, disposed over the cover plate;

(d) an aperture plate, disposed over the electrical heater structure and having at least one aperture;

(e) an electrically insulating spacer member located between the electrical heater structure and engaging the aperture plate, such electrically insulating spacer member having at least one opening, corresponding to the first plurality of openings of the cover plate and the spaced passages of the housing; and

(f) means for applying current to the electrical heater structure to produce heat sufficient to vaporize the pellets and permit vapor efflux of materials to pass through the first plurality of openings of the cover plate, the heater structure, the electrically insulating spacer member and the apertures of the aperture plate, onto the substrate.